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GEOPHYSICS.—*Isostasy in India.*[1] WILLIAM BOWIE, Coast and Geodetic Survey.

The investigations carried on by the United States Coast and Geodetic Survey in recent years have proved conclusively that for the total area of this country isostasy is practically perfect. The two reports on the gravity reductions show that areas in the United States of much smaller extent than the whole are largely compensated. This is clearly shown by the gravity anomaly map in the last gravity report.[2] But the area of the United States is a small percentage of the land surface of the earth and the scientist may well reserve judgment as to whether complete isostasy obtains generally until the theory has been tested in other lands. It is the earnest hope of advocates of this theory, and even of its opponents, that such tests may be undertaken in the near future. The determination of the dimensions of the mean figure of the earth (the ellipsoid) and the actual shape of the earth's surface (the geoid) are problems which the truth or falsity of the theory of isostasy will help the geodesist to solve. The degree of rigidity and the strength of the earth's crust may be more closely estimated or computed after knowing more about isostasy, and this is a very important matter to the geologist, the

[1] Paper read in abstract before the Philosophical Society of Washington on April 11, 1914.

[2] Illustration No. 2, Effect of Topography and Isostatic Compensation on the Intensity of Gravity. Special Publication No. 12, U. S. Coast and Geodetic Survey.

TABLE 1

SUMMARY OF RESULTS, 1912–13

STATION	LATITUDE	LONGITUDE	HEIGHT ABOVE M. S. L.	OBSERVED VALUE OF g	CORRECTION FOR		$g_0 = g$ CORRECTED FOR HEIGHT ONLY	$g_0'' = g$ CORRECTED FOR HEIGHT AND MASS (BOUGUER)	γ_0	$g_0 - \gamma_0$ (Free Air)	$g_0'' - \gamma_0$ (Bouguer)	$g - \gamma$ (Hayford)
					Height	Mass (Bouguer)	Mass (Hayford)						
	° ′ ″	° ′ ″	*feet*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*	*dynes*
1. Bhopal	23 15 58	77 25 00	1630	978.711	+0.152	−0.057	−0.007	978.803	978.806	978.810	+0.053	−0.004	+0.046
2. Ballanpur	24 07 11	77 39 17	1763	978.777	+0.164	−0.062	−0.011	978.841	978.879	978.867	+0.074	+0.012	+0.063
3. Kina	24 10 41	78 11 46	1355	978.795	+0.120	−0.047	±0.000	978.921	978.874	978.871	+0.050	+0.003	+0.050
4. Coona	24 38 48	77 10 13	1560	978.807	+0.146	−0.055	−0.007	978.053	978.898	978.903	+0.050	−0.005	+0.043
5. Lalitpur	24 41 29	78 21 26	1109	978.814	+0.112	−0.042	+0.003	978.926	978.884	978.906	+0.020	−0.022	+0.023
6. Sipri	25 25 52	77 39 25	1533	978.876	+0.143	−0.054	−0.009	979.019	978.965	978.958	+0.061	+0.007	+0.052
7. Jhansi	25 27 02	78 33 43	858	978.910	+0.080	−0.030	+0.007	978.990	978.960	978.959	+0.031	+0.001	+0.038
8. Gwalior	26 13 57	78 12 49	658	978.958	+0.061	−0.023	+0.012	979.019	978.996	979.015	+0.004	−0.019	+0.016
9. Dholpur	26 42 01	77 54 47	577	978.999	+0.054	−0.020	+0.015	979.053	979.033	979.048	+0.005	−0.015	+0.020
10. Agra	27 10 20	78 01 07	535	979.056	+0.050	−0.019	+0.018	979.106	979.087	979.083	+0.023	+0.004	+0.041
11. Mattra	27 29 25	77 41 48	562	979.072	+0.052	−0.020	+0.019	979.124	979.104	979.105	+0.019	−0.001	+0.038
12. Hathras	27 36 52	78 03 22	587	979.075	+0.055	−0.021	+0.020	979.130	979.109	979.116	+0.014	−0.007	+0.034
13. Aligarh	27 53 32	78 00 31	612	979.075	+0.057	−0.021	+0.021	979.132	979.111	979.137	−0.005	−0.026	+0.016
14. Khurja	28 14 19	77 51 53	649	979.083	+0.061	−0.023	+0.024	979.143	979.120	979.163	−0.020	−0.043	+0.004

geophysicist, the seismologist, and the astronomer. There are other branches of scientific research to which this question of isostasy is also of interest and importance.

Gravity reductions made by the older methods, the Free Air, which ignores topography, and the Bouguer, which postulates a rigid earth with the topography as an added load, do not give any definite idea as to the strength of the earth's crust. It is believed that the new (Hayford) method does give valuable information on this question.

In India and Italy gravity stations are being reduced by the Hayford method and it is the work already done in the former country that is the basis of this paper. In the Report of the Board of Scientific Advice for India for 1912–13, there are given the results of the reduction of fourteen gravity stations which throw some light on the question of the degree of perfection of isostasy in India. These stations are in approximately the same longitude and extend from latitude 23° 16′ to latitude 28° 19′. The report gives the data for the fourteen stations listed in table 1.

The theoretical value of gravity, γ_0, shown in table 1, is obtained from the Helmert formula of 1884, which is

$$\gamma_0 = 978.00\ (1 + 0.00531 \sin^2 \phi)$$

The means of the anomalies of the several methods of reduction without regard to sign are: Free Air, 0.031; Bouguer, 0.012; Hayford, 0.035; The means with regard to sign are: Free Air, +0.029; Bouguer, −0.008; Hayford, +0.035.

These values of the anomalies with regard to sign for the several methods of reduction, and by the old Helmert formula, indicate the presence of systematic errors in the reductions, though the Bouguer method seems to be the one most nearly free from such errors.

The constants in the new Helmert formula (1901) are derived from many more gravity stations and much more accurate data. This formula is

$$\gamma_0 = 978.030\ (1 + 0.005302 \sin^2 \phi - 0.000007 \sin^2 2\phi)$$

When the 1901 formula is used to obtain the theoretical value of gravity at sea level and at the latitude of the station the sea level values and the anomalies are those shown in table 2.

TABLE 2

STATION	γ_0	$g_0 - \gamma_0$ (Free Air)	$g_0'' - \gamma_0$ (Bouguer)	$g - \gamma$ (Hayford)
1. Bhopal	978.835	+0.028	−0.029	+0.021
2. Balianpur	978.892	+0.049	−0.013	+0.038
3. Kina	978.896	+0.025	−0.022	+0.025
4. Goona	978.928	+0.025	−0.030	+0.018
5. Lalitpur	978.931	−0.005	−0.047	−0.002
6. Sipri	978.983	+0.036	−0.018	+0.027
7. Jhansi	978.984	+0.006	−0.024	+0.013
8. Gwalior	979.039	−0.020	−0.043	−0.008
9. Dholpur	979.073	−0.020	−0.040	−0.005
10. Agra	979.107	−0.001	−0.020	+0.017
11. Muttra	979.128	−0.004	−0.024	+0.015
12. Hathras	979.139	−0.009	−0.030	+0.011
13. Aligarh	979.160	−0.028	−0.049	−0.007
14. Khurja	979.186	−0.043	−0.066	−0.019

The means of the anomalies are as follows: Without regard to sign: Free Air, 0.021; Bouguer, 0.032; Hayford, 0.016. With regard to sign: Free Air, +0.003; Bouguer, −0.032; Hayford, +0.010.

This formula makes the mean Hayford anomalies without regard to sign smaller than the mean anomalies by the other methods, but the mean with regard to sign is smaller for the Free Air anomalies. The sign of the Free Air anomalies seems to change with the change in elevation of the stations. All except one of the anomalies at stations above 800 feet are positive, while all stations with elevations less than 800 feet have negative anomalies. The Bouguer anomalies are all negative, and the values are double the values of the Hayford anomalies on an average.

With the 1901 Helmert formula applied the anomalies indicate that the rigid crust postulated in the Bouguer method is far from the truth.

The United States Coast and Geodetic Survey formula[3] for theoretical gravity (Helmert's formula of 1901 with a new first

[3] See p. 25, Effect of Topography and Isostatic Compensation upon the Intensity of Gravity. Special Publication No. 12, U. S. Coast and Geodetic Survey.

TABLE 3

STATION	γ_0	$g_0 - \gamma_0$ (Free Air)	$g_0'' - \gamma_0$ (Bouguer)	$g - \gamma$ (Hayford)
1. Bhopal	978.843	+0.020	−0.037	+0.013
2. Balianpur	978.900	+0.041	−0.021	+0.030
3. Kina	978.904	+0.017	−0.030	+0.017
4. Goona	978.936	+0.017	−0.038	+0.010
5. Lalitpur	978.939	−0.013	−0.055	−0.010
6. Sipri	978.991	+0.028	−0.026	+0.019
7. Jhansi	978.992	−0.002	−0.032	+0.005
8. Gwalior	979.047	−0.028	−0.051	−0.016
9. Dholpur	979.081	−0.028	−0.048	−0.013
10. Agra	979.115	−0.009	−0.028	+0.009
11. Muttra	979.136	−0.012	−0.032	+0.007
12. Hathras	979.147	−0.017	−0.038	+0.003
13. Aligarh	979.168	−0.036	−0.057	−0.015
14. Khurja	979.194	−0.051	−0.074	−0.027

term) as derived from gravity observations in the United States is:

$$\gamma_0 = 978.038\,(1 + 0.005302 \sin^2 \phi - 0.000007 \sin^2 2\phi)$$

If this formula is used for the India stations we have the results listed in table 3.

Then the mean anomaly becomes: Without regard to sign: Free Air, 0.023; Bouguer, 0.040; Hayford, 0.014. With regard to sign: Free Air, −0.005; Bouguer, −0.040; Hayford, +0.002.

Here we have a mean Hayford anomaly with regard to sign of almost zero which is an indication that the Coast and Geodetic Survey formula more nearly meets the conditions in India, within the small area under consideration, than either of the two Helmert formulas.

The values at the different stations vary in size and sign and therefore we seem to have local rather than regional departures from the perfect isostatic state. The data, though small in amount, indicate that isostasy may be nearly as perfect for large areas in India as in the United States. We await with great interest further reports on the important and valuable investigations now being made in that country.

GEOLOGY.—*Correlation of the Hawthorn formation.*[1] THOMAS WAYLAND VAUGHAN and CHARLES WYTHE COOKE, Geological Survey.

Dr. W. H. Dall in 1892 applied the name Hawthorn beds to certain upper Oligocene deposits of clay and phosphatic sandstones which outcrop in northern Florida and are characterized by silicified oyster shells and silicified corals. Among the localities mentioned are several near Hawthorn, Devils Mill Hopper near Gainesville, the hilltops near Archer and Arredonda, Nigger Sink and a well near Newnansville, Fort White, a sink 4 miles north of Lake City, and White Springs on Suwannee River. In 1894 Doctor Dall published the statement that the Hawthorn beds are to be correlated with the Chattahoochee series, as are also the Orthaulax bed and Tampa limestone at Tampa and the chert of Hillsboro River. This correlation was adopted by Clapp and Matson.

Studies subsequent to those of Doctor Dall, published in 1894, have all tended to confirm the essential correctness of his opinion regarding the age relations of the Chattahoochee "series" and the beds around Tampa mentioned by him; but additional information obtained during the progress of field work in Florida having led to doubts as to the correctness of the stratigraphic reference of the Hawthorn beds, a special re-examination of all important localities was made during the field season of 1913. In this connection, in fairness to Doctor Dall, it should be stated that his account of the Hawthorn "beds" was mostly based on the field notes of others and that he did not personally examine the critical exposures. An exposure at White Springs, Suwannee River, Hamilton County, proved to be the key to the problem.

Following is the description of the section at this locality published by Doctor Dall from notes supplied by Dr. J. C. O'Neal:

At White Springs on the Suwannee the following section was obtained:

[1] Published by permission of the Director of the U. S. Geological Survey.

	feet
1. Gray soil, sand, and humus	2
2. White sand	4
3. Clay with silicified corals and oyster (Hawthorne beds)	6–8
4. Indurated clayey rock (Hawthorne beds?)	2
5. Clayey sand-rock, rather fine-grained and soft	4
6. The same, somewhat coarser and harder	8–10
7. Sand rock of coarser, sharp grains, coated and cemented together with white, limy matter	4–6
8. Foraminiferal Eocene top-rock (Vicksburg) indefinitely below....	

The silicified corals of bed No. 3 are sometimes 20 to 60 pounds in weight, and along the river when dislodged from the clay often wear immense potholes in the softer lime rocks. Miocene sharks' teeth and fragments of bone also occur in the clay. Under bed No. 8, when it is tilted up, as occurs in various places along the river, is found the older Orbitoides limestone of the Vicksburg group.

The following is a description of a section observed by us near White Springs:

Section, Rock Island and spring about 250 feet above it, left bank of Suwannee River, about three-quarters of a mile in a straight line above the White Springs wagon bridge.

	THICKNESS feet	inches
10. Terrace material about 60 feet above water level in the river. This represents the extensive, highest terrace recognized along Suwanne River,—the sands grayish or white	12	
9. Yellowish sands, about	12	
8. Grayish sand on surface, float of oyster shells, etc., about	13	
7. Bed with gray concretions, immediately above which are many silicified *Ostrea mauricensis*, *Siderastrea* sp., and fossil bones, probably manatee	1	
6. Greenish sands and clays	1	
5. Calcareous quartz sands coated by calcium carbonate; numerous phosphatic particles. Fossils: Orbitolites, Ostrea, etc	4	
4. Calcareous sands containing rotten shell fragments	1	2
3. Light colored, greenish-gray sandy marl containing many fossil shells but fewer specimens of Pecten than the underlying bed	4	9
2. Base of spring section, light colored, greenish-gray sandy marl; sand grains clear quartz, mostly rounded. Many blackish phosphatic particles. Fossils numerous: *Goniopora* sp., *Pecten madisonius* var. *sayanus*, *Ostrea mauricensis*. (The dip of this bed is about 2½ feet in 50 feet; direction S. 50° E., that is up stream. Between it and the chert and limestone exposed at Rock Island it is estimated that about 5 feet are concealed.)	2	6

1. The material exposed at Rock Island outcrops about 150 feet down stream from the spring exposure. The rock was originally a yellowish granular limestone which has been largely silicified. The silicification is frequently or usually as concentric shells. In some instances silicified masses are surrounded by unchanged material. The echinoid genus Cassidulus is common. A number of species of fossil mollusks were collected. Worn specimens of *Ostrea mauricensis* and *Siderastrea* sp. were also seen on the surface, but these had evidently washed out of overlying beds and had been brought secondarily into the position where seen. (The geologic age of this bed will be discussed in a future publication. It is probably not of Vicksburg age, as stated by Professor O'Neal.) Down stream from Rock Island the dip is again down stream and the marls overlying the limestone and chert are again exposed. The exposure at Rock Island is due to a small anticline lying across the river course.

The silicified corals, Siderastrea, and silicified specimens of *Ostrea mauricensis* were seen at many places where they overlie the fossiliferous marl bed which carries a fauna very similar to that of the Chipola marl member and the Oak Grove sand member of the Alum Bluff formation.[2]

In this locality the Hawthorn formation either overlies or is a part of the Alum Bluff formation. The lithology, greenish gray sand and clay—the clay frequently resembling fuller's earth—is that usual for the typical Alum Bluff. *Ostrea mauricensis* is a common species in that formation; and as there is no stratigraphic break in the deposition, the Hawthorn formation as here exposed should in our opinion be considered as only a part of the Alum Bluff formation.

Similar material, in places containing a larger proportion of phosphatic sandstone, usually with silicified oysters and specimens of Siderastrea, was found at all the localities cited by Doctor Dall. At Alachua limesink the phosphatic sandstone is interbedded with greenish clays. The material was traced as far southward as Ocala where it immediately overlies the Ocala limestone of the Vicksburg group.

It seems definitely established that the Hawthorn formation does not represent any part of the Chattahoochee formation but

[2] The term Alum Bluff formation as used in this paper, in that it is made to include the Chipola marl as a member, differs from the sense in which Doctor Dall originally applied it.

is the essential equivalent of the Alum Bluff formation, if the basal fossiliferous marl exposed at White Springs be included with the Hawthorn. In western Florida the formation rests upon the Chattahoochee formation, while in central Florida, from Gainesville and Alachua southward, it immediately overlies the Ocala limestone.

Although the term "Hawthorn beds" was proposed in 1892 and Alum Bluff in 1894, it seems better to suppress Hawthorn and adopt Alum Bluff, as the latter term has been extensively applied in western Florida and the formation traced across southern Georgia and thence northeastward to Savannah River.

MINERALOGY.—*The optical properties of azurite and alamosite.* H. E. MERWIN, Geophysical Laboratory.

Azurite. The chief optical properties of azurite, except the refractive indices, were described by Des Cloizeaux.[1] I have measured microscopically the refractive indices and 2V of crystals from Broken Hills, Australia, and from Butte, Montana. The observed values for the two specimens do not differ more than as indicated. For Na-light $\alpha = 1.730 \pm 0.002$, $\beta = 1.758 \pm 0.003$, $\gamma = 1.838 \pm 0.003$.

Very thin sections transmit sufficient Na-light to permit a fairly satisfactory measurement of 2V by the method based upon the curvature of a zero isogyre. Three measurements varied between 62° and 70°. The optic axis of each of these sections could be located within 0.75°. Such location was not measurably different for the greenish-blue light transmitted by the section in white light. From one thick section showing an optic axis and the acute bisectrix an accurate measurement of 2V gave the value 68°. Very thin sections show slight horizontal dispersion. With decreasing wave-length the refractive index increases rapidly. The following values were observed: at $671\mu\mu$ $\alpha = 1.719$, at $589\mu\mu$ $\alpha = 1.730$, at $486\mu\mu$ $\alpha = 1.756$.

Since 2V for yellow and blue are nearly equal, the observed angle, $2E = 151°$, obtained by Des Cloizeaux may be reduced to

[1] Manuel de Minéralogie **2**: 194. 1874.

2V by using $\beta = 1.758$. The resulting value is $2V = 67°$. Thus the crystals from three localities are optically similar or quite identical.

Alamosite, $PbSiO_3$. In the original description of alamosite[2] the only optical property definitely described was that the optic plane is parallel to the plane of symmetry and the cleavage. The results of a further microscopical study of a few fragments of the original mineral are here presented.

α and γ for Na-light were measured, with a probable error of ± 0.001, in standard mixtures of piperine, and antimony and arsenic iodides, and also in solutions of arsenic trisulphide in methylene iodide. β was computed $\alpha = 1.947$, $\beta = 1.961$, $\gamma = 1.968$. A measurement of $\gamma - \alpha$ on a cleavage fragment in Na-light gave the value 0.023. Dispersion of the optic axes is very strong, but the inclined dispersion of the bisectrices is too weak to be measured with the microscope. A few grains embedded in a medium with refractive index near β were found suitable for measuring the angle between the acute bisectrix and an optic axis. By observing the direction of greater refraction in these grains the negative optical character of the mineral, which had not been satisfactorily determined on account of the strong dispersion, was established. 2V for Li-light $= 58°$; for Na-light $= 65°$; for blue light ($\lambda = 425\mu\mu$) $= 78°$—all within $\pm 5°$.

Two small pieces were fused on a strip of platinum, and the refractive index of the glass found by the method used for the crystals. Most of the fragments of the crushed glass from both pieces were alike, $n = 1.906$. For a very few fragments $n = 1.910$ to 1.920. Possibly a few specks of cerrusite were adhering to the crystal grains.

[2] Palache and Merwin, Amer. Journ. Sci. IV. **27**: 399. 1909.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. Each of the scientific bureaus in Washington has a representative authorized to forward such material to this journal, and abstracts of official publications should be transmitted through the representative of the bureau in which they originate. The abstracts should conform in length and general style to those appearing in this issue.

GEODESY.—*Fourth general adjustment of the precise level net in the United States and the resulting standard elevations.* WILLIAM BOWIE and H. G. AVERS. Special Publication No. 18, U. S. Coast and Geodetic Survey. Pp. 328, 4 pls., 1 map. 1914.

This publication contains the results of all precise leveling, done in the United States before the year 1912, which formed closed loops. Several spur lines were not included. The elevations are referred to mean sea level as the datum. The mean level of the sea at all points on the open coasts is supposed to define a level or equipotential surface. Deviations from this condition, if they exist, are not great enough to be detected by leveling of even the highest quality. When the mean sea levels at two tidal stations are connected the discrepancy is of such an order that it may be due to the accumulated errors of leveling.

The great advantage of having mean sea level as the datum for leveling is that the field work may start from many points; valuable checks on the results are obtained; and the leveling of neighboring countries may be joined to form a continuous net over a whole continent. These conditions would not be possible if each country adopted an arbitrary datum.

The lines of precise leveling are so interlaced that they form a complicated network, and the elevation of an interior point can be obtained by a number of different routes from the sea coast. The whole net was made consistent by an adjustment by the method of least squares, which furnished the most probable values for each of the points common to two or more lines. The elevations of the intermediate bench marks were then made to agree with the adjusted values of these junction points.

The present precise level net is considered to be of such strength and extent that the elevations resulting from this fourth adjustment can

be held fixed for an indefinite time and they are, therefore, termed "standard."

It was found to be necessary to apply a correction to the field levels (the levels as actually run) to account for the non-parallelism of equipotential surfaces. In leveling the correction is an appreciable one when the distance between the surfaces is large.

The elevations are given in both feet and meters. It was thought best to abandon the custom previously followed (that is, to give the elevations in meters only), as all topographic maps in this country use the foot as the unit of elevation in contouring. It is also true that all railroads and other engineering organizations use feet entirely for elevations.

In the future any new lines of precise leveling will be adjusted to fit into the net without in any way disturbing previously adopted elevations. As each new line added to the net may have some influence on all or nearly all the elevations, adjustments will be made from time to time which will give the theoretically best values of the junction points of the net, which will be of great scientific interest and value, but such adjustments will not interfere with the standard elevations.

W. B.

GEOLOGY.—*Geology of the pitchblende ores of Colorado.* EDSON S. BASTIN. U. S. Geological Survey Professional Paper 90-A. Pp. 5, with 2 plates. 1914.

This account of the mode of occurrence of pitchblende at Quartz Hill in Gilpin County, Colorado, is published in advance of a much larger report on the same region in which many other types of ore deposits will be considered. The prevailing rocks are pre-Cambrian igneous and sedimentary rocks and tertiary intrusives mainly of monzonitic composition. The pitchblende occurs as a constituent of a number of sulphide veins which traverse both the pre-Cambrian and the Tertiary rocks.

On the basis of mineral composition the sulphide veins of this region may be divided into (1) the pyritic type and (2) the lead-zinc type. The principal primary minerals of the pyritic type are pyrite and quartz; chalcopyrite and tetrahedrite are almost invariably present in subordinate amounts, and enargite, fluorite, and rhodochrosite occur here and there. The primary minerals commonly present in the veins of the lead-zinc type are galena, sphalerite, pyrite, chalcopyrite, quartz, and calcite. Some parts of the district are characterized solely by one or the other of these types of mineralization, but in many of the veins both types are present. In such veins it has been demonstrated by repeated exposures

that the lead-zinc type is somewhat later than the pyritic type and that the minerals of the former commonly line vugs or fractures in those of the latter. It is believed, however, that the lead-zinc mineralization followed close upon the heels of the pyritic mineralization, and that the two types represent merely successive epochs in one great vein-forming period. Although the mineral veins cut the monzonite porphyry dikes and stocks, it is believed that both came from a common deep-seated source, the ore-bearing solutions following the monzonite intrusion after a short interval.

Microscopic studies of the pitchblende ores indicate that they represent a local and unusual variation in the sulphide mineralization of the region. It is believed that the pitchblende was deposited during the earlier or pyritic mineralization, that it was afterward fractured, and that the fractures thus formed were filled by sulphides of the later or lead-zinc mineralization. The general geologic relations and the absence of characteristic high-temperature minerals in the deposits of Quartz Hill, as well as in those of Cornwall and the Erzgebirge, indicate that the pitchblende was deposited under conditions of moderate temperature and pressure. Unlike the European pitchblende, however, the pitchblende of Quartz Hill is not associated with nickel and cobalt minerals, which so far as known have never been found in that region even in small quantities. The occurrence of pitchblende in pegmatite as well as in mineral veins of the type here described shows that the mineral may also form under conditions of high temperature and pressure. E. S. B.

ENTOMOLOGY.—*On interspecific mating in Phengodes and inbreedings in Eros.* H. S. BARBER. Proceedings of the Entomological Society of Washington **16**: 32–34. March 23, 1914.

Females of a species of Phengodes easily distinguished from *P. laticollis* in both sexes of adults and also in the larval stage were confined with males of *P. laticollis*. In most cases the male did not recognize the female; but some did, and in two instances there was mating of a short duration. One female deposited three infertile eggs; the other 48 fertile and infertile eggs. In the latter case some embryos developed but did not issue; ten larvae issued, all but two deformed and unable to feed; these two, which lived and fed for fifteen months, showed the specific characteristics of the male.

It is pointed out that most groups of insects have some obstacle tending to prevent inbreeding and that those which have no obstacle are usually somewhat degraded and inclined to form numerous local

races or color forms. Observations are cited showing *Eros humeralis* to be an example of this group. In Phengodes the obstacle appears to be that the males develop after two years in the larval stage, while the females must spend three or more years as larvae. In Micromalthus the adults appear to become sexually mature only after a migratory flight. J. C. CRAWFORD.

ANTHROPOLOGY.—*Antiquities of the upper Verde and Walnut Creek Valleys, Arizona.* J. W. FEWKES. 28th Ann. Rept. Bur. Amer. Ethnology, pp. 181–220, pl. 79–102, figs. 56–68. 1912 [pub. 1913].

This is a report on a visit to the ruins of prehistoric remains of buildings in Arizona, made to determine the western limits of the agricultural Indians called Pueblos. It describes and figures fifteen ruins hitherto unknown, and points out their characteristic features. It states that buildings of two types, forts crowning the eminences and wattle-walled dwellings scattered along the river banks, coexist with cave dwellings, and that no one of these ruins resembles the typical terraced community houses commonly called pueblos. Architecturally these are more closely related to those in southern Arizona than to the pueblos. The memoir closes with a reference to the age of the ruins and an account of the probable character and kinship of their former inhabitants. J. W. F.

ANTHROPOLOGY.—*Casa Grande, Arizona.* J. W. FEWKES. 28th Ann. Rept. Bur. Amer. Ethnology, pp. 25–179, pls. 1–78, figs. 1–54. 1912 [pub. 1913].

This is a final report on the excavation and repair of the famous ruin, Casa Grande, undertaken by the Smithsonian Institution in 1906 and 1907–08. The memoir quotes at length from the various historical descriptions of the ruin from its discovery, in the year 1694, to the present time, supplementing these written accounts with legends gathered from Piman and other Indians still living in the neighborhood. It likewise contains a comprehensive description, copiously illustrated, of buildings, encircling walls, and other characteristic architectural features revealed by the excavations, and describes the methods of repair adopted for their permanent preservation. Various objects (stone axes, pottery, shell, wood, basketry, etc.) found in the course of the work are figured, described, and, where possible, interpreted. The memoir closes with general considerations of the age of Casa Grande, the kinship of the makers, and probable manners and customs of the former inhabitants, as affected by the climatic and other environmental conditions. The author regards the prehistoric dwellings as different from pueblos, and their inhabitants as culturally characteristic. J. W. F.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE WASHINGTON ACADEMY OF SCIENCES

The 87th meeting of the Washington Academy of Sciences was held at the Cosmos Club, Thursday evening, December 4, 1913. The following were elected resident members of the Academy: John F. Anderson, N. L. Bowen, R. H. Chapman, Harvey L. Curtis, Edwin Clarence Eckel, Daniel Folkmar, Frederick E. Fowle, Hoyt S. Gale, Donnel F. Hewett, Walter D. Hunter, J. F. Jameson, George W. Morey, Eugene F. Mueller, S. N. D. North, W. J. Peters, E. D. Tillyer, Percy H. Walker, Elmer G. Woodruff.

After the election of the new members the Academy, in joint session with the Philosophical Society of Washington, listened to an illustrated lecture on the *Brownian movement and molecular reality* by Prof. JEAN PERRIN, of the University of Paris. It was explained that the Brownian movement has furnished visible and experimental proof of all the principal gas laws; that it has demonstrated the reality of the molecular constitution of matter; and that it has given four of the seventeen known independent methods of determining the number of gas molecules per unit volume.

The 88th meeting of the Washington Academy of Sciences, a joint meeting with twenty other societies, was held in the hall of the Carnegie Institution of Washington, Friday evening, December 5, 1913, in memory of the late Dr. W. J. McGEE.

Mr. FREDERICK V. COVILLE presided and introduced the speakers, all of whom had been intimately associated with Dr. McGee at some stage of his career. GIFFORD PINCHOT declared that much of the success of forestry work was due to ideas advanced by Dr. McGee, and Dr. FRANZ BOAS, of Columbia University, read a paper analyzing the character and value of his work.

Other speakers included Dr. MILTON WHITNEY, N. H. DARTON, HENRY GANNETT, Col. H. C. RIZER, F. W. HODGE, and J. A. HOLMES. The speeches, letters and papers read, with other material relating to the life and work of Dr. McGee, will be printed in book form.

The societies, which took part, and their representatives were: American Anthropological Association, F. W. HODGE; American Association of Museums, FREDERICK L. LEWTON; American Civic Association, H. K. BUSH-BROWN, and RICHARD B. WATROUS; American Forestry Association, P. S. RISDALE; American Institute of Electrical Engineers, J. H. HANNA and E. B. ROSA; American Society of Mechanical

Engineers, Gen. WILLIAM H. BIXBY, CALVIN W. RICE, and JOSEPH A. HOLMES; Anthropological Society of Washington, D. S. LAMB, DONNEL F. HEWETT, and DANIEL FOLKMAR; Archaeological Institute of America, JOHN W. FOSTER, HERBERT PUTNAM, and MITCHELL CARROLL; Biological Society of Washington, F. H. KNOWLTON; Chemical Society of Washington, F. W. CLARKE, WILLIAM BLUM, F. K. CAMERON, and W. F. HILLEBRAND; Columbia Historical Society, THEODORE W. NOYES, W. B. BRYAN, and M. I. WELLER; Explorers' Club, Rear Admiral ROBERT E. PEARY, D. L. BRAINARD, and HENRY BREVOORT KANE; Lake to the Gulf Deep Waterways Association, W. K. KAVANAUGH, G. A. BUDER, EDWIN S. MUNROE, Major WOOD, T. EDWARD WILDER, E. S. CONWAY, WILLIAM F. BOURLAND, WILLIAM H. RUSSE, W. M. KAVANAUGH, GEORGE B. LOGAN, JOHN F. MESSMORE, J. F. O. RELLER, ARTHUR LEACH, E. H. DEFFENBAUGH, LYMAN E. COOLEY, H. H. WALKER, ALEXANDER Y. SCOTT, JAMES S. WARREN, and H. F. AUTON; National Conservation Association, HERBERT A. SMITH, PHILIP P. WELLS, and H. A. SLATTERLY; National Conservation Congress, THOMAS R. SHIPP; Philosophical Society of Washington, L. A. BAUER, J. H. GORE, and C. K. WEAD; Sequoia League, ALICE C. FLETCHER, F. W. HODGE, C. HART MERRIAM; State Historical Society of Iowa, The Hon. H. M. TOWNER; Upper Mississippi River Improvement Association, THOMAS WILKINSON; National Rivers and Harbors Congress, Col. S. A. THOMPSON.

The 89th meeting of the Washington Academy of Sciences was held in the Lecture Hall of the National Museum, Thursday evening, January 8, 1914. Prof. JOHN C. MERRIAM, of the University of California gave an illustrated lecture on the *Fauna of the Pleistocene asphalt at Rancho La Brea, California*. It was explained that, when cool, tar is so firm that animals can walk over it safely but that, on being warmed, especially on summer days, it softens and entraps any animal that attempts to cross it. Animals caught in this manner attract others, and thus the asphalt deposit has become filled with the bones of thousands of animals in which canid forms, such as the Great Wolf, largely predominate. Many of the species preserved in this death trap of the ages are extinct, while others, representing later catches, belong to the present fauna.

The 90th meeting of the Washington Academy of Sciences, the 16th annual meeting, was held at the Cosmos Club, Thursday evening, January 15, 1914, with President Tittmann in the chair. The following were elected officers for the ensuing year: *President*, DAVID WHITE; *Corresponding Secretary*, GEORGE K. BURGESS; *Recording Secretary*, W. J. HUMPHREYS; *Treasurer*, E. W. PARKER. Resident *Vice-Presidents* from local societies: Anthropological, F. W. HODGE; Archaeological, MITCHELL CARROLL; Biological, PAUL BARTSCH; Botanical, F. L. LEWTON; Chemical, M. X. SULLIVAN; Electrical Engineers, E. B. ROSA; Engineers, G. W. LITTLEHALES; Entomological, A. L. QUAINTANCE; Foresters, W. B. GREELEY; Geological, F. L.

RANSOME; Historical, J. D. MORGAN; Philosophical, L. A. FISCHER; Non-resident *Vice-Presidents:* IRA REMSEN and J. M. COULTER. *Managers,* Class of 1917, A. H. BROOKS and L. O. HOWARD.

The report of the Corresponding Secretary showed the total membership to be 369, an increase of 14 during the past year, and that the Academy has lost by death the following: Dr. J. R. EASTMAN, the first President of the Academy, Prof. ALEXANDER MACFARLANE, Dr. ROBERT FLETCHER, and Gen. C. W. RAYMOND.

The Treasurer's report showed the total receipts to be $4805.69, disbursements $3657.82, cash on hand $1147.87, and investments $12,090.

The report of the Auditing Committee was also received.

President-elect White then took the chair and President TITTMANN delivered an address on *Our northern boundaries.* (This Journal, **4**: 37–45. 1914.)

The following were elected to resident membership: W. N. BERG, W. R. BLAIR, W. BLUM, C. W. BURROWS, BERT S. BUTLER, R. O. E. DAVIS, L. H. DEWEY, PAUL J. FOX, H. C. GORE, MONROE HOPKINS, J. T. KELLEY, Jr., Dr. HAVEN METCALF, J. F. MITCHELL, G. E. PATRICK, Dr. W. W. RANDALL, W. SALANT, A. SEIDELL, W. W. SKINNER, Dr. ERWIN F. SMITH, Dr. W. W. STOCKBERGER, RENE DE M. TAVEAU, W. H. WAGGAMAN.

The 91st meeting of the Washington Academy of Sciences, a joint meeting with the Chemical Society, was held at the Cosmos Club, Monday evening, March 16, 1914, with Dr. M. X. SULLIVAN, President of the Chemical Society, in the chair.

Prof. WOLFGANG OSTWALD of the University of Leipzig gave a most interesting address on *The chemistry of colloids.*

The following were elected to resident membership in the Academy: E. C. CRITTENDEN, J. H. DELLINGER, D. R. HARPER, 3rd., J. T. HEDRICK, A. S. HITCHCOCK, R. S. MCBRIDE, B. MCCOLLUM, SIDNEY PAIGE, JOHN RYDER WELLINGTON, and RAPHAEL ZON.

Owing to his absence from the city on official business at the times of certain of these meetings, the Recording Secretary had to impose upon the kindness of others, Mr. J. S. Diller and Dr. G. K. Burgess, to whom he wishes to express his thanks, for much of the above information.

W. J. HUMPHREYS, *Recording Secretary.*

THE BOTANICAL SOCIETY OF WASHINGTON

The 95th regular meeting was held at the Play House on Tuesday evening, March 3, 1914, at eight o'clock, at which the retiring President, Dr. W. W. Stockberger, delivered an address on *The social obligations of the botanist* (to be published in SCIENCE).

The 96th regular meeting of the society was held at the Cosmos Club Tuesday, April 7, 1914, at eight o'clock. Messrs. Robert B.

Whitney and H. S. Westover were unanimously elected to membership in this society.

The scientific program was as follows:

PROF. A. S. HITCHCOCK reviewed (a) A paper by Trabut in which he states that the oat commonly cultivated in temperate regions descended from *Avena fatua*, the Algerian oat from *A. sterilis*, and *A. strigosa* from *A. barbata;* (b) a paper by Schulz on the origin of wheat, in which he states that *Triticum monococcum* descended from *T. aegilopoides*, *T. dicoccum* from *T. dicoccoides*, and *T. spelta* from an as yet undiscovered wild form; that the naked wheats are derived from the spelt wheats, *T. turgidum*, *T. durum*, and *T. polonicum* from *T. dicoccum*, and *T. vulgare* and *T. compactum* from *T. spelta*.

DR. H. L. SHANTZ reviewed a paper by Sir Francis Darwin[1] describing a method by which the influence of stomatal adjustment on the rate of transpiration is eliminated. The stomata of the lower surface of the leaf are locked with cocoa butter or petrolatum and incisions made through the upper epidermis, thus connecting the intercellular spaces with the outer air. By this method transpiration was found to decrease proportionally as relative humidity increased. The straight line relation led to the conclusion that a relative humidity of 105 would be required to reduce transpiration to zero.

MR. C. S. SCOFIELD, *Chinese wild rice*, with lantern (to be published later).

DR. P. SPALDING, *Present status of the white pine blister rust*, with lantern (to be published as a Bulletin of the Department of Agriculture).

MR. R. ZON, *Meteorological observations for purposes of botanical geography, agriculture, and forestry*, with lantern. The inadequacy of the present climatic data for the purposes of botanists lies not so much in the kind and character of observations that are being recorded as in the manner of their classification, their grouping, and computing.

To properly understand plant life it is essential to group meteorological data by actual periods of growth and rest. During each of these two periods plants react to temperature of the air in an altogether different way. The temperature records of the temperate region of the United States should be computed separately on the basis of the normal monthly mean not reduced to sea level for the period of rest or the period of growth, and in some localities also for a third period, the hot period. The period of rest should include all months having a normal mean temperature of 48°F. or less. In the period of growth should be included all months having a normal monthly temperature of from 50° to 72°F. The hot period in temperate latitudes should embrace months with a normal average temperature of more than 72°F.

A map showing localities with the same duration of the periods of growth and rest has been tentatively prepared.

[1] Proceedings of the Royal Society, Series B, vol. 87, February, 1914.

Aside from monthly mean temperatures the average temperatures by periods of ten days (decades) are also desirable, and also the mean temperatures for periods when the ground is covered with snow and periods when the ground is bare; similarly, the mean temperature for each period during which certain winds prevail.

Summation of temperatures as suggested by Bussengo and de Candolle do not indicate the actual requirements of plants for heat, since they overlook the existence of an optimum temperature for the development of each plant.

Groups of days with a given temperature are considered preferable, and the following classification is suggested:

1. Freezing days, with a daily average of 32° or less. These are further subdivided into: (a) freezing days without thawing; (b) freezing days with thawing.

2. Cold days, with an average daily temperature ranging from 32° to 40°F. This group should be further divided into: (a) days with frost; (b) days without frost.

3. Cool days, with an average daily temperature from 40.1° to 50°F. This group should be divided into: (a) days with frost; (b) days without frost.

The paper discussed also the temperature of the soil, humidity of the air, precipitation, snow cover, soil moisture, sunshine, and barometric pressure.

P. L. RICKER, *Corresponding Secretary.*

THE CHEMICAL SOCIETY

The 237th meeting was held at the Cosmos Club on Thursday, April 9, 1914. The following papers were read:

F. P. DEWEY, of the Bureau of the Mint: *The pyrometer in the assay muffle.* This paper is an emphatic protest against the practice of stating specific temperatures for conducting assay work in the muffle. The pyrometer is an excellent guide to temperature conditions in the muffle, but the success of the work depends upon the temperature of the oxidizing lead button. This is entirely different from the pyrometer reading and is vitally influenced by conditions which have little or no effect on the pyrometer. (Author's abstract.)

Discussion: Walker inquired whether an optical pyrometer had ever been used; Dr. Dewey replied that the surface exposed is too small for any accurate measurement. A. N. Finn inquired about American pyrometers.

H. S. WASHINGTON, of the Geophysical Laboratory: *The distribution of the chemical elements in the earth's crust.* About 8500 rock analyses have been recently tabulated by the author. The distribution of chemical elements as revealed by these analyses may be considered from two viewpoints: (1) Their distribution in general over the earth's surface; (2) their distribution with respect to each other. The earth's surface is in a general way divisible into "petrographic provinces" distinguished

by their relatively higher or lower percentages of certain oxides. As to relative distribution, the following facts have been established: Alumina and the alkalies usually accompany high silica while calcium and iron go with low silica. Iron is accompanied by sodium, magnesium by potassium. Calcium accompanies aluminum predominantly. Cerium and yttrium, the radioactive elements, lithium, and fluorine all occur predominantly in the sodic rocks. The iron bearing rocks are the usual habitat of nickel and vanadium. Magnesian rocks hold the chromium and the platinum metals. Rocks high in potash are relatively rare. There seem to be two kinds of association: (1) Physico-chemical; (2) association in petrographic provinces. The distribution of barium and scandium seems to be of the latter type.

Discussion: Clarke pointed out that many elements formerly considered rare are widely distributed and present in greater percentages than are those elements usually considered common. Most of these are elements of lower atomic weight than copper. In reply to questions it was stated that titanium occurs usually either as a constituent of pyroxenes or in ilmenite in ores. Beryllia is also more widely distributed than usually supposed, but its analytical separation from alumina has never been well worked out.

W. O. EMERY and S. PALKIN of the Bureau of Chemistry: *The estimation of antipyrin.* Presented by Mr. Palkin. The methods described depend upon the formation of an iodo-antipyrin and its reduction by sulfur dioxide in alcoholic or acetic acid solution. The widest variation by these methods is 0.8 per cent on 250 milligrams.

R. E. LEE, of the Corby Company: *The Guillaume apparatus for the distillation and rectification of alcohol.* The American apparatus for alcohol production requires two stages of rectification, while the European Guillaume is continuous. The latter also yields 90 per cent as against 60 to 65 for the American. The apparatus and process were described in detail with the aid of diagrams.

Andrews, Tolman, and others asked questions, to which the speaker replied that live and exhaust steam enter the beer column together and are at nearly the same pressure; also that the columns are not jacketed.

The 238th meeting was held at the Cosmos Club on Monday, April 20, 1914. Dr. C. E. KENNETH MEES, Director of the Research Laboratory of the Eastman Kodak Company of Rochester, spoke on *The physical chemistry of photography.* He discussed the physico-chemical principles of photographic development and the question of standard light sources for photographic research, and described the lines of work now being carried on at the Laboratory, illustrating his descriptions with lantern slides.

In the discussion which followed, questions were asked by Sosman and others about research on photographic papers. Dr. Mees replied that the principal difficulty has been in the measurement of reflecting power, for which he is now using the Bechstein illuminometer. The question of production of spots in plates by bacteria was discussed by Andrews, Sullivan and Dr. Mees.

ROBERT B. SOSMAN, *Secretary.*

REFERENCES

Under this heading it is proposed to include, by author, title, and citation, references to all scientific papers published in or emanating from Washington. It is requested that authors coöperate with the editors by submitting titles promptly, following the style used below. These references are not intended to replace the more extended abstracts published elsewhere in this JOURNAL.

ENTOMOLOGY

BANKS, N. *On a collection of neuropteroid insects from the Philippine Islands.* Proceedings of the Entomological Society of Washington **15**: 170–180, pls. 8 and 9. January 22, 1914. (Describes two new species in each of the families Psocidae, Perlidae, Myrmeleonidae, and Mantispidae, and three in the family Chrysopidae; also the new genera Tagalopsyche, Ecnopsyche, and eight new species of Trichoptera.—J. C. C.)

BARBER, H. S. *Notes on a wood-boring syrphid.* Proceedings of the Entomological Society of Washington **15**: 151, 152. January 22, 1914. (*Temnostoma bombylans* was reared and comparison of the various larvae found show great differences in the armature of the spiracle, from which it appears that about four species are mixed under the single specific name.—J. C. C.)

BARBER, H. S. *Notes on Rhipidandri (Coleoptera).* Proceedings of the Entomological Society of Washington **15**: 188–193. January 22, 1914. (Describes a new species of the genus Eutomas from Panama and gives notes on the other species in the collection of the National Museum.—J. C. C.)

BUSCK, A. *Note on a barkmining lepidopteron of the genus* Marmara *Clemens.* Proceedings of the Entomological Society of Washington **15**: 150. January 22, 1914. (*Marmara fulgidella* was reared from oak, the larvae exhibiting the typical form for species of this genus.—J. C. C.)

BUSCK, A. *A new Gracilaria on Azalea.* Insecutor Inscitiae Menstruus **2**: 1, 2. January 31, 1914. (Describes one new species which possibly may have been imported from Europe.—J. C. C.)

BUSCK, A. *The chestnut bastminer.* Insecutor Inscitiae Menstruus **2**: 3, 4. January 31, 1914. (Describes *Ectoedemia phleophaga* and gives notes on the habits of the larva.—J. C. C.)

CRAWFORD, J. C. *A revision of the braconid genus Urosigalphus.* Insecutor Inscitiae Menstruus **2**: 22–27. February 28, 1914. (Gives a table of all the known species and describes eight new species, all from the United States.—J. C. C.)

CUSHMAN, R. A. *Biological notes on a few rare or little known parasitic Hymenoptera.* Proceedings of the Entomological Society of Washington **15**: 153–160. January 22, 1914. (Gives observations on *Perilitus americanus*, a parasite of adult beetles; *Paniscus geminatus* from a lepidopteron; *Polysphincta texana*, an external parasite of adult spiders; *Sphaeropyx bicolor*, a parasite of *Apatela clarescens*.—J. C. C.)

DYAR, H. G. *Two new Phycitinae from Montana.* Insecutor Inscitiae Menstruus **2**: 2. January 31, 1914.

DYAR, H. G. *Four new Lepidoptera from British Guiana.* Insecutor Inscitiae Menstruus **2**: 4–6. January 31, 1914. (Describes three hesperiids and one liparid.—J. C. C.)

DYAR, H. G. *A note on Phobolosia and Melanomma.* Insecutor Inscitiae Menstruus **2**: 8–10. January 31, 1914. (Gives a table of the North American species of the genus Phobolosia and describes one new species.—J. C. C.)

HOOD, J. D. *Notes on the life history of* Rhopalosoma poeyi *Cresson.* Proceedings of the Entomological Society of Washington **15**: 145-147. January 22, 1914. (This species was found to be an external parasite of an adult jumping tree cricket, *Orocharis saltator* Uhler; nothing was previously known of the life-history of this anomalous genus.—J. C. C.)

HOOD, J. D. *Notes on North American Thysanoptera, with descriptions of a new family and two new species.* Insecutor Inscitiae Menstruus **2**: 17–22, pl. 1. February 28, 1914. (Describes two new species and establishes the new family Merothripidae, based on the anomalous species *Merothrips morgani* Hood.—J. C. C.)

HOPKINS, A. D. *Parallelism in morphological characters and physiological characteristics in scolytoid beetles.* Proceedings of the Biological Society of Washington **26**: 209–212. December 20, 1913.

KNAB, F. *A new Pantophthalmus.* Insecutor Inscitiae Menstruus **2**: 27–29. February 28, 1914. (Describes *P. fastuosus*, the larvae of which bore in trunks of trees in Trinidad.—J. C. C.)

LUTZ, A. *Forest malaria.* Proceedings of the Entomological Society of Washington **15**: 169, 170. January 22, 1914. (A further statement of the author's contention that malaria can be transmitted to man by anopheles which have not previously been in contact with man.—J. C. C.)

ROHWER, S. A. *Notes on the feeding habits of two adult sawflies.* Proceedings of the Entomological Society of Washington **15**: 148, 149. January 22, 1914. (A female of *Tenthredella lineata* was seen eating an adult perlid, *Alloperla signata; Tenthredo arcuatis* was seen feeding on stamens of an umbelliferous plant.—J. C. C.)

ROHWER, S. A. *Two abnormally developed sawflies.* Proceedings of the Entomological Society of Washington **15**: 149, 150. January 22, 1914. (Records an abnormal female of *Xenapates terminalis* and a male of a species of the genus Tenthredella.—J. C. C.)

ROHWER, S. A. *Descriptions of new parasitic Hymenoptera.* Proceedings of the Entomological Society of Washington **15**: 180–188. January 22, 1914. (Describes the new genera Stilbopoides and Helcostizidea from the United States and five new species in the Ichneumonidae, also two new species of Braconidae.—J. C. C.)

SHANNON, R. C. Epimecis wiltii *Cresson and its host.* Proceedings of the Entomological Society of Washington **15**: 162. January 22, 1914. (The larva of this species is an external parasite of spiders.—J. C. C.)

SHANNON, R. C. *Feeding habits of* Phlebotomus vexator *Coq.* Proceedings of the Entomological Society of Washington **15**: 165, 166. January 22, 1914. (Observations tend to show that this species feeds normally upon reptiles rather than upon warm-blooded animals.—J. C. C.)

SNYDER, T. E. *Changes during quiescent stages in the metamorphosis of termites.* Proceedings of the Entomological Society of Washington **15**: 162–165, pls. 6 and 7. January 22, 1914. (Observations of the molting soldier larvae of *Leucotermes flavipes, L. virginicus* and *Termopsis augusticollis* show that the differentiation of the soldier caste takes place during a quiescent stage rather late in the life cycle, the larva being previously, to all external appearances, undifferentiated.—J. C. C.)

TOWNSEND, C. H. T. *New muscoid flies, mainly Hystriciidae and Pyrrhosiinae from the Andean Montanya.* (Continuation.) Insecutor Inscitiae Menstruus **2**: 10–16. January 31, 1914. (Describes, in the family Exoristidae, the new genera Neaphria, Xenoplagia and Gymnochaetopsis, and two new species.—J. C. C.)

WRIGHT, W. S. *Notes on certain Californian Lepidoptera.* Insecutor Inscitiae Menstruus **2**: 6–8. January 31, 1914.

ORNITHOLOGY

BANGS, O. *The green heron of the Maldives.* Proceedings of the Biological Society of Washington **26**: 93, 94. May 3, 1913. (Describes *Butorides albidulus*, sp. nov.—W. R. M.)

BANGS, O. *A new warbler from western China.* Proceedings of the Biological Society of Washington **26**: 95, 96. May 3, 1913. (*Reguloides pulcher vegetus*, subsp. nov., is described from western Szechwan.—W. R. M.)

COOKE, W. W. *Bird migration in the District of Columbia.* Proceedings of the Biological Society of Washington **26**: 21–26. February 8, 1913.

HOWELL, A. H. *Descriptions of two new birds from Alabama.* Proceedings of the Biological Society of Washington **26**: 189–202. October 23, 1913. (*Corvus brachyrhynchos paulus* and *Pipilo erythrophthalmus canaster*, subspp. nov., are described.—W. R. M.)

MEARNS, E. A. *Description of a new African grass-warbler of the genus Cisticola.* Smithsonian Miscellaneous Collections **60**^{20}: 1, 2. February 14, 1913.

MEARNS, E. A. *Descriptions of three new African weaver-birds of the genera Estrilda and Granatina.* Smithsonian Miscellaneous Collections **61**^{9}: 1–4. July 31, 1913.

MEARNS, E. A. *Descriptions of four new African thrushes of the genera Planesticus and Geocichla.* Smithsonian Miscellaneous Collections **61**^{10}: 1–5. August 11, 1913.

MEARNS, E. A. *Descriptions of five new African weaver-birds of the genera Othyphantes, Hypargos, Aidemosyne, and Lagonosticta.* Smithsonian Miscellaneous Collections **61**^{14}: 1–5. September 20, 1913.

MEARNS, E. A. *Descriptions of ten new African birds of the genera Pogonocichla, Cossypha, Bradypterus, Sylvietta, Melaniparus, and Zosterops.* Smithsonian Miscellaneous Collections **61**^{20}: 1–8. November 29, 1913.

MEARNS, E. A. *Descriptions of eight new African bulbuls.* Smithsonian Miscellaneous Collections **61**^{35}: 1–6. February 16, 1914. (Describes 1 species and 7 subspecies in 4 genera, from British East Africa.—W. R. M.)

NELSON, E. W. *Two new subspecies of birds from the slopes of Mount Pirri, eastern Panama.* Smithsonian Miscellaneous Collections **60**^{21}: 1, 2. February 26, 1913.

NELSON, E. W. *A new subspecies of nun bird from Panama.* Proceedings of the Biological Society of Washington **26:** 67, 68. March 22, 1913. (Describes *Monasa pallescens minor*, from Marraganti, eastern Panama.—W. R. M.)

PHILLIPS, J. C. *Two new African birds.* Proceedings of the Biological Society of Washington **26:** 167, 168. June 30, 1913. (Describes *Caprimulgus eleanorae*, from the Blue Nile, and *Passer domesticus Chephreni*, from Egypt.—W. R. M.)

RILEY, J. H. *A new hummingbird of the genus Chlorostilbon from Brazil.* Proceedings of the Biological Society of Washington **26:** 63, 64. March 22, 1913. (Describes *Chlorostilbon puruensis*, sp. nov.—W. R. M.)

RILEY, J. H. *The king rail of Cuba.* Proceedings of the Biological Society of Washington **26:** 83–86. March 22, 1913. (The resident form of the king rail in Cuba is described as a new subspecies, *Rallus elegans Ramsdeni*.—W. R. M.)

RILEY, J. H. *The Bahama barn owl.* Proceedings of the Biological Society of Washington **26:** 153, 154. June 30, 1913. (Description of the Bahaman barn owl as a new subspecies, *Tyto perlatus lucayanus*.—W. R. M.)

TODD, W. E. C. *Preliminary diagnoses of apparently new birds from tropical America.* Proceedings of the Biological Society of Washington **26:** 169–174. August 8, 1913. (There are here described 33 new subspecies and species in 32 genera, including one new genus, Microstilbon, with a single known species, *M. insperatus*, from Bolivia.—W. R. M.)

ANTHROPOLOGY

BUSHNELL, D. I., JR. *Archeological investigations in Ste. Genevieve County, Missouri.* Proceedings of the U. S. National Musuem **46:** 641–668, text figs. 1–8, pls. 50–57. March 4, 1914.

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